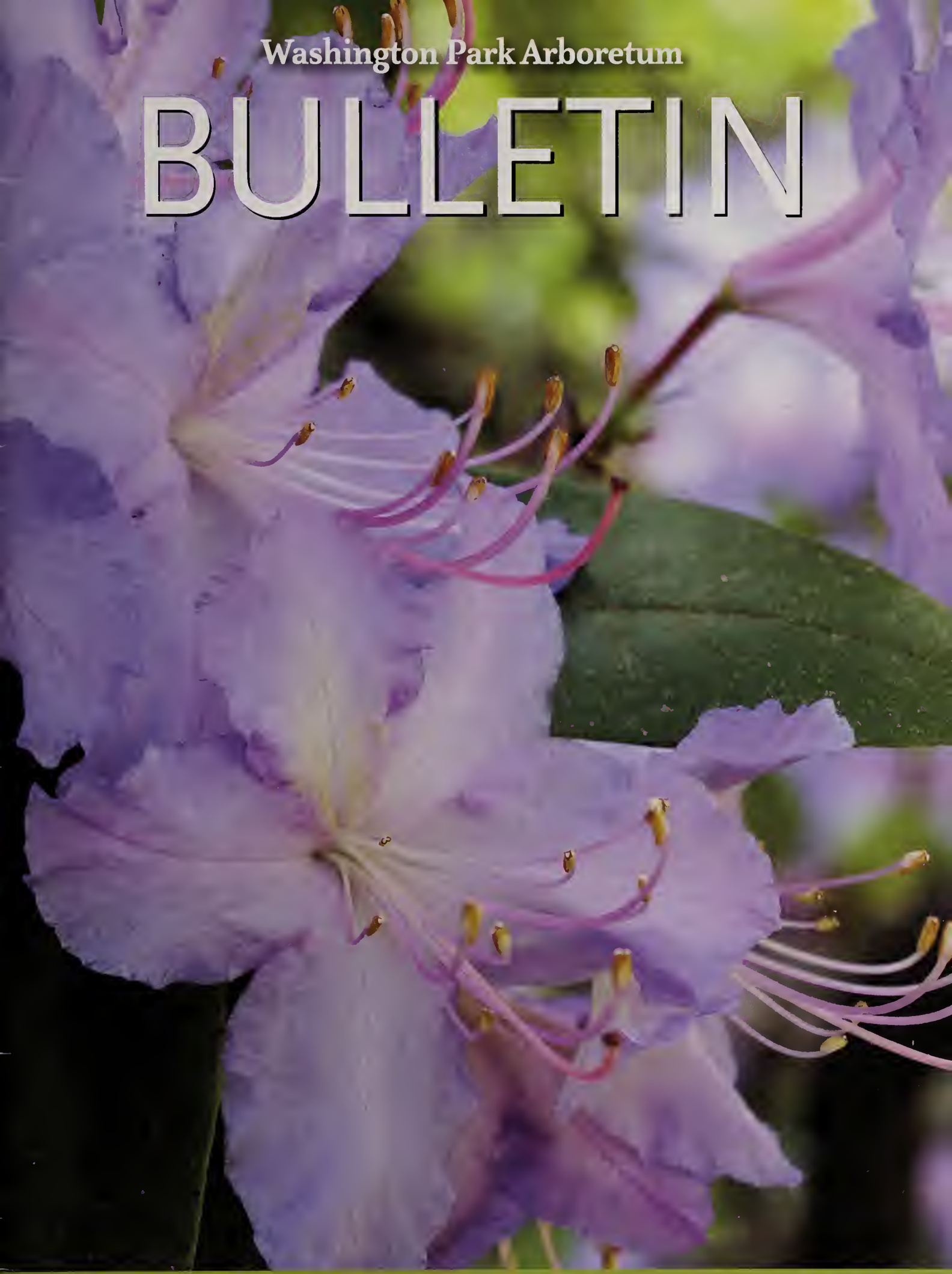
Washington Park Arboretum

BULLETIN



Published by the Arboretum Foundation

Spring 2014

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Washington Park Arboretum

The Arboretum is a 230-acre dynamic garden of trees and shrubs, displaying internationally renowned collections of oaks, conifers, camellias, Japanese and other maples, hollies and a profusion of woody plants from the Pacific Northwest and around the world. Aesthetic enjoyment gracefully co-exists with science in this spectacular urban green space on the shores of Lake Washington. Visitors come to learn, explore, relax or reflect in Seattle's largest public garden.

The Washington Park Arboretum is managed cooperatively by the University of Washington Botanic Gardens and Seattle Parks and Recreation; the Arboretum Foundation is its major support organization.

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The Arboretum Foundation's mission is to create and strengthen an engaged community of donors, volunteers and advocates who will promote, protect and enhance the Washington Park Arboretum for current and future generations.

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SPRING 2014 VOLUME 76. ISSUE 1.
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IN MEMORY OF JANET KOWALCZEWSKI WHITNER (1949–2013)

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ABOVE: *Prunus* x *yedoensis* blooming near the north end of Azalea Way in late March. (Photo by Niall Dunne.)

ON THE COVER: The species rhodie *Rhododendron augustinii* blooming in early May near Azalea Way, south of the Rhododendron Hybrids section. (Photo by Niall Dunne.)

Continuity and Change

As I write from the Garden District in New Orleans, the azaleas, camellias and roses are putting on quite a show as the crowds gather for the Mardi Gras parades. This is a city that holds tight to its traditions, even as it has adapted and renewed itself in the wake of the terrible devastation of Hurricane Katrina. It is spring in this town that knows how to party, and the mood here is optimistic and lighthearted.

Back in Seattle, we are emerging from the dark and grey months of the year. It has been a tough few months for the Arboretum. This winter, we grieved the passing of longtime board member Dave Hervey and former "Bulletin" editor, Jan Whitner. Both lost their long battles with cancer, and in them we in the Arboretum lost two of our dearest friends. I wrote about Jan last summer, and this issue of the "Bulletin" is dedicated to her.

Now, as the days lengthen, our pace quickens. The Flower and Garden Show is behind us. We experimented with the Opening Night Party this year and were delighted with the changes. For the first time in its 26-year history, the Party sold out. Sold out! We loved collaborating with glass artist Ginny Ruffner and honoring her work and garden with our display garden this year.

The Party and the display garden made us all proud, but there has been no time to bask in their warm glow. With only two months between events, planning for FlorAbundance, our annual plant sale, immediately went into full swing.

It was quite a feat to hold FlorAbundance in the Arboretum for the past two years, while Building 30 at Magnuson Park was being renovated. But, the sale long ago outgrew its roots in the Arboretum: Parking, traffic and unpredictable weather were all hurdles to overcome. We are so pleased and relieved to be bringing the sale back to its home in Magnuson Park this spring.

Our full complement of specialty nurseries will be back—most of them under cover in the big hangar space of Building 30. And we will be facing our own blend of continuity and change. Like Event Chair Bob Lilly, many of our volunteers have been working this sale for decades; hundreds of them will be there, performing the tasks they know so well. Guiding and helping them will be our small staff—most of whom have only worked the sale in its Arboretum incarnation these past two years. Together we will all be there to welcome you back to the biggest and best plant sale in Seattle. The sale days are April 26 and 27; our members-only Pre-Sale & Party will be on April 25. Like the opening day of boating season and strolling Azalea Way on Mother's Day, FlorAbundance is a Seattle rite of spring! Don't miss it!

Cheers,

Paige Miller

Paige Miller, Executive Director,
Arboretum Foundation

The Seattle-Luoyang Peony Festival

By Phil Wood

Peonies have a bright future in Seattle. This winter, the Seattle Chinese Garden completed planting hundreds of tree peony rootstocks, and it will celebrate their blooms this May when the Seattle–Luoyang Peony Festival opens to the public.

Paeonia suffruticosa 'Fragrant Jade'. (Photo by Sandy Marvinney)

Background on the Chinese Garden

Located in West Seattle adjacent to South Seattle Community College, the Seattle Chinese Garden invites visitors to experience some of the marvels of China without ever having to leave Seattle. It grew out of Seattle's Sister City relationship with Chongqing, China and is designed by the Chongqing Parks Bureau. The Garden's first courtyard opened to the public in early 2011.

The Seattle Chinese Garden joins three other Chinese gardens on the West Coast: the Dr. Sun Yat-Sen Classical Chinese Garden in Vancouver, B.C.; the Lan Su Chinese Garden in Portland, Oregon; and the Garden of Flowing Fragrance at the Huntington, near Los Angeles. Unlike these three, which are based on scholars' gardens in the Suzhou area near Shanghai, the Seattle Chinese Garden takes its inspiration from gardens in Sichuan Province and the Municipality of Chongqing, a thousand miles up the Yangtze River from Shanghai. The Chongqing designers drew from memorial gardens and temples in the rugged terrain of southwest China. The design fits perfectly into the Seattle garden's sloping site, surrounded on two sides by a green belt.

Chinese gardens are centers for both culture and horticulture, and the Seattle Chinese Garden is no exception: It has a schedule of activities in 2014 that includes martial arts demonstrations, Chinese conversation lessons, a Celebrate Sichuan event and a kite-flying festival. The non-profit Seattle Chinese Garden Society plans to raise the funds to build the rest of the garden in the coming years and eventually cover five acres. The future Floating Clouds Pavilion will provide views of the city skyline, Elliott Bay and Mount Rainier. A teahouse overlooking a lotus pond will offer refreshments, and the Gathering Together Hall will provide room for meetings and banquets for 200. The garden will include a bamboo walk and a stream rushing through a rocky gorge into a lake.

The Luoyang Connection

The Garden has developed a relationship with the city of Luoyang—the peony capital of China. (Luoyang's annual peony festival draws millions of visitors from all around the world for three weeks each April.) In 2012 and 2013, the Garden received large donations of tree peony plants from Luoyang and its peony growers, under the auspices of the American Peony and Culture Association.

ABOVE: Tree peonies at the 2013 Peony Festival in Luoyang, China. It's a festival tradition to become one with the massive peony beds and pose for a photo. (Photo by Jim Dawson)

LEFT: *Paeonia suffruticosa* 'Silver Red.' (Photo by Sandy Marvinney)

Peonies have been cultivated for over 2000 years in China. First mentioned in Chinese literature in the fourth century BCE, they have played an important role in the culture and arts of China. While the herbaceous peony (*Paeonia lactiflora*, or *shaoyao* in Mandarin) is highly regarded, the tree peony (*Paeonia suffruticosa*, or *mudan* in Mandarin) is the king of flowers in China, appearing frequently in painting and poetry.

The new collection in the Seattle Chinese Garden consists of more than 400 tree peony plants, representing 27 different varieties. They have evocative names: 'Luster of Jade' (Jing Yu) is white with a pink blush, and 'Shining Black Gold' (Wu Jin Yao Hui) is deep red. The flower colors include white, pink and many shades of red; the flower types are single, semi-double and double.

Peony Festival Details

The Seattle Chinese Garden will host the Seattle-Luoyang Peony Festival on Saturday, May 3. The event will feature talks on peony care and the importance of these plants in Chinese culture, a peony art exhibit, and a peony plant sale. Keep an eye out, too, for the Garden's annual Bamboo Festival on May 17 and 18, which includes talks on bamboo care and a plant sale by members of the Pacific Northwest Chapter of the American Bamboo Society.

Cultivating Tree Peonies

Tree peonies are not technically "trees" but more like mid-sized deciduous shrubs, growing between three to six feet tall. However, unlike herbaceous peonies, which die to the ground each year (and grow two to four feet tall), tree peonies do develop woody stems. Each tree peony plant will bear up to 50 flowers when mature. Tree peonies usually bloom in early to mid-May, two to three weeks earlier than herbaceous peonies, which bloom

ABOVE: The first shipment of tree peony rootstock arrived from Luoyang in November 2012. Pictured here (from left to right) are Kirk Chia, president of the American Peony Art and Culture Association (APACA); Yiqiao (George) Jiang of Luoyang and APACA; Seattle Chinese Garden Horticulture Chair (and article author) Phil Wood; and horticulturist and garden volunteer Riz Reyes. (Photo by Sandy Marvinney)

LEFT: Yiqiao (George) Jiang helps a visitor select a peony painting at the 2013 Seattle-Luoyang Peony Festival. Mr. Jiang is a native of Luoyang and son of China's top-ranked peony painter. He is also a skilled artist himself, and a businessman who divides his time between Seattle and Luoyang. (Photo by Liz Hattemer)

around Memorial Day—and their flowers tend to be bigger than those of herbaceous varieties.

Tree peonies do very well in the Pacific Northwest and grow best in well-drained soil in a site with at least six hours of sun. In China, they are displayed in large public gardens, planted en masse in beds with no companion plants. Most home gardens in the Northwest don't have the room for that kind of large display—but gardeners here should still indulge because tree peonies also look wonderful in the mixed border.

In a mixed border setting, consider choosing companion plants with evergreen foliage to add interest to the bare stems of tree peonies in winter. For example, the ground cover *Geranium macrorrhizum* adds bright green foliage and spring flowers. When choosing flowering shrubs as companions, select species with earlier or later bloom times than tree peonies to extend seasonal interest. *Pieris japonica*, the lily-of-the-valley shrub, makes a fine accompaniment, providing both glossy, evergreen leaves and mid-March bloom.

Plant peony roots in the fall when they are available by mail order. In the spring, some local nurseries have them available in pots. This spring, Swanson's Nursery and Wells Medina Nursery will have tree peonies from Luoyang for sale.

Visiting the Seattle Chinese Garden

The tree peonies in the Seattle Chinese Garden are expected to be in peak bloom during the first three weeks in May. Exact bloom time will depend on the weather. Of course, the Garden is worth visiting any time during the year. For directions, call 206-964-5219 or visit www.seattlechinesegarden.org. Current open hours through October 31 are Tuesday through Sunday, from 11:30 a.m. to 5 p.m. Check the Garden's website for updates and for late-fall and winter hours.

Adjacent to the Seattle Chinese Garden is the South Seattle Community College Arboretum, built and maintained by the Landscape Horticulture Program of the college. It is open from dawn until dusk every day. Don't miss the Coenosium Rock Garden, with one of the largest collections of dwarf conifers in the United States. ~

Phil Wood is the owner of Phil Wood Garden Design (www.philwoodgardens.com), a residential landscape design and installment company. In recent years, he has helped design many of the Arboretum's award-winning exhibits at the Northwest Flower & Garden Show. Phil also serves on the editorial board of the "Bulletin."

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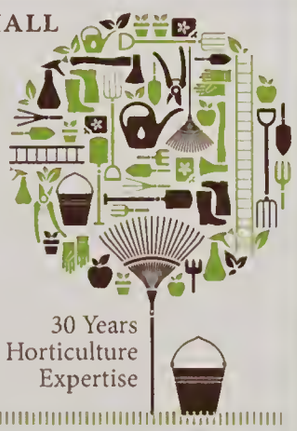

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IRRESISTIBLE OFFERINGS AT THE 2014

Anemone x 'Macaneoo1' Wild Swan™
(Photo courtesy Helen Johnstone,
patientgardener.wordpress.com.)

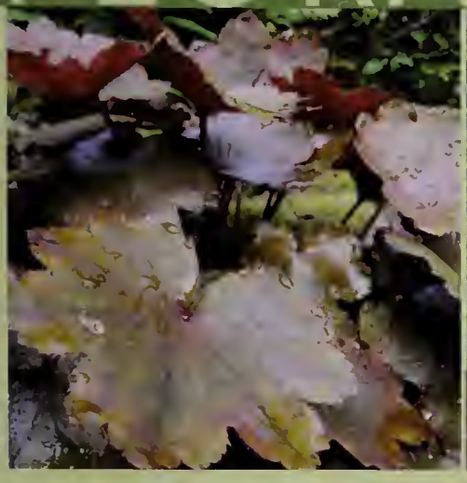
By Janine Anderson

After two years in its interim location at the Arboretum, FlorAbundance—our region's largest and best plant sale—returns in late April to the newly renovated Building 30 at Warren G. Magnuson Park, Seattle. A spring tradition since 1947, the sale features dozens of specialty nurseries selling a wonderful selection of locally grown trees, shrubs, perennials, annuals and edibles. Following are short profiles of four of the nurseries attending the sale, plus some of the plant offerings that they're most excited about this year. It's just a small taste of the cornucopia of botanical treasures that awaits shoppers at FlorAbundance.

Growing Girls Nursery

Beth Burman grew up in a gardening family and landed her first horticultural job in 1974. She had no formal schooling in horticulture, but her green thumb and dexterous fingers were useful for planting bedding plants and sowing seeds (all done manually in those days). In about 1990, while working at the Herbfarm in Fall City, Washington, Beth discovered Heronswood Nursery and Plant Delights Nursery—and their wide offerings of unusual shade species, which led her to develop an interest in woodland species

FLORABUNDANCE!



Saxifraga fortunei 'Rubrifolia' (Photo courtesy Beth Burman.)

Podophyllum pleianthum (Photo courtesy Dancing Oaks Nursery, www.dancingoaks.com.)

Eupatorium fortunei 'Pink Frost' (Photo courtesy Mark Dwyer, Rotary Botanical Gardens.)

from around the Earth's temperate belt. Beth fell in love with shade gardening and its unlimited combinations of foliage texture and began collecting and growing at her North Bend home. Eventually, she started her own small wholesale nursery. Now, with the help of Cheryl VanBlom, her friend in plant addiction, she shares her bounty, as she says, "From my garden to yours."

What to Look For

Saxifraga fortunei 'Rubrifolia' is slow to propagate, so Beth never has it in abundance; but it is so fabulous that you might consider shopping early to get one! A Japanese perennial with shiny, full, bronzy-red foliage and stems, it grows about eight inches tall and produces airy clusters of white flowers on rose-pink stems in midsummer. Hardy to USDA Zone 6, this fully deciduous woodland plant prefers some moisture and a nest of leaf litter or leaf mold. It not only works well in a woodland setting, but also in a lightly shaded rock garden—as well as in pots.

Podophyllum pleianthum, the Chinese Mayapple, continues to be one of Beth's favorite "big foliage" plants. Each individual plant produces a single stem crowned with just one or two, umbrella-shaped leaves—but the leaves grow to about 14 inches wide and 20 inches tall. As an added bonus, a cluster of large, showy, maroon-red flowers hangs underneath the foliage in spring and develops into rich-red, apple-like fruits. Hardy from USDA Zones 6 to 8, the plant performs well in full to part shade (avoid hot direct sun) and colonizes slowly in reasonably moist soil. Use it in a shady border, woodland garden or shaded cottage garden.

White Picket Gardens

Kristi Fina, a Master Gardener who studied agricultural economics at Washington State University, started White Picket Gardens in 1996 as a way to stay home with her two small children. The nursery, based in rural Stanwood, Snohomish County, has now grown into a wholesale enterprise that specializes in unique perennials for the greater Seattle retail nursery industry. White Picket Gardens offers a range of tried-and-true perennials as well as some new hybrids for the plant collector in all of us. The nursery also grows herbs for the wholesale market using only organic fertilizers. From spring through summer, White Picket Gardens can be found at plant sales throughout the greater Seattle area.

What to Look For

Anemone × 'Macane001' Wild Swan™ is an excellent new hybrid Japanese anemone. From June until November, yellow-centered, pure-white flowers—with blue-violet banding on the outside of the sepals—are held high above the tidy green foliage. The plant does not re-seed

Cypripedium 'Emil' (Photo courtesy Arlen Hill.)

and is great as a cut flower and for massing in a woodland setting. It is also deer resistant and hardy from USDA Zones 6 through 8.

Eupatorium fortunei 'Pink Frost' is terrific as a foliage accent plant in sun or partial shade. Its pink-tinted leaves are boldly edged in white. Pink flower clusters sit atop the foliage from late summer into fall and are magnets for butterflies. This Joe Pye weed—a cultivar of a Chinese species—requires moist soil but has no "bad" habits. It grows to about three feet tall and is deer resistant and hardy in USDA Zones 4 through 9.

Keeping It Green Nursery

Also located in Stanwood, Keeping It Green Nursery was established in 2004. It is owned and operated by Arlen Hill, whose passion for hiking in the Pacific Northwest led to an avid interest in uncommon native plant species. Keeping It Green specializes in hardy orchids and woodland perennials, with a particular focus on *Sorbus, Iris, Lilium, Erythronium, Trillium* and any plants in the Berberidaceae family. Arlen continues to explore wild habitats in an ongoing effort to understand how to replicate the complex ecological relationships and environmental conditions of nature in mixed-genus display gardens.

What to Look For

Cypripedium 'Emil' is one of the finest yellow-and-chocolate-flowered hybrids available. This lady's slipper orchid has vigorous growth, forming impressive clumps in a relatively short time. In May, the foot-high flower stalks are decorated with medium-sized flowers that last for about a month. What's more, 'Emil' looks especially nice when planted with other spring bloomers such as *Primula sieboldii* and *Epimedium*. It does best in bright open shade or filtered sun that is sheltered during the hottest part of the day. To keep the plants actively growing and producing new tips for the following year, keep them watered during the season.

Epimedium grandiflorum 'Spring Wedding' is a delight in the spring, with red-ringed new growth and cheery, light-pink flowers held above glossy foliage. This barrenwort should be planted in bright shade to filtered sun. Like other epimediums, 'Spring Wedding' is drought tolerant, though it grows more vigorously with regular water during the growing season.

Windpoppy Farm and Nursery

Windpoppy Farm and Nursery is a wholesale nursery—located in Ferndale, Washington—that specializes in ornamental grasses and

Epimedium grandiflorum
'Spring Wedding'
(Photo courtesy Arlen Hill.)

Lepechinia hastata
(Photo courtesy Jessica Friedland, Salmon Creek Photography)

Iris domestica
(Photo courtesy Tom Murphy, Wikipedia Commons)

unusual perennials. The nursery serves garden centers in the greater Seattle area and offers retail sales by appointment. Owners John and Sara Burns both earned degrees in horticulture from Colorado State University. They moved to Western Washington 10 years ago and worked as growers for nurseries in Whatcom County. Four years ago, Windpoppy Farm and Nursery was born. John and Sara love propagating, cultivating and sharing their plants with the community.

What to Look For

Lepechinia hastata (pitcher sage) is a bold and beautiful sage relative, growing quickly to three or four feet with a two-foot or greater spread. Native to Hawaii, it bears large, fragrant, tropical-looking, gray-green leaves. In summer, tall, mint-like spires of reddish-purple blossoms that attract hummingbirds are held on the branch tips. This full-sun perennial is hardy to at least 20°F, quite drought tolerant, and not appealing to deer. Plant it in a well-draining soil.

Iris domestica (formerly *Belamcanda chinensis*) features the foliage of an iris, the blooms of a lily, and the fruit of a blackberry (sort of). It's also long blooming, very easy to grow, and perfect for a sunny border. The red-spotted, deep-orange flowers arise in midsummer and continue well into fall in most areas. They are followed by plump seedpods that split open when ripe to reveal a glossy, blackberry-like seed cluster—hence the common name of blackberry lily. (The fruit is not edible.) Give *Iris domestica* full sun to light shade in any well-drained soil, including rocky or clay ones. The plant will reach two to three feet and is hardy from USDA Zones 5 to 10. ~

Janine Anderson, CPH, is an award-winning Pacific Northwest-based landscape designer (www.anderson-design.net), garden writer, speaker and member of the "Bulletin" Editorial Board.

FlorAbundance Details

This year's spring plant sale is Saturday, April 26, from 9 a.m. to 5 p.m., and Sunday, April 27, from 10 a.m. to 3 p.m., in Building 30 at Warren G. Magnuson Park. Admission and parking are free. For the best selection, attend the Member Pre-Sale & Party on Friday, April 25, from 5:30 to 8 p.m. Tickets for the preview party can be purchased through the Arboretum Foundation website, www.arboretumfoundation.org, or by calling 206-325-4510. (Early-bird tickets cost $40; after April 11, party tickets will be $50 each.) All sales at FlorAbundance help support education programs and maintenance at Washington Park Arboretum.

Smarty Plants

Recent Breakthroughs in the Study of Plant Behavior

By Janet Marinelli

For as long as people have been classifying living creatures, plants have been considered the dumb blondes of the biosphere. If we see them at all, we see plants as domestic accessories, with all the awareness of an Eames molded-plywood chair. Even gardeners tend to see plants as horticultural eye candy, flaunting their pretty flower heads solely for our pleasure.

Most scientists also have assumed that plants are essentially passive: rooted in place, taking whatever moisture, nutrients and sunlight chance brings their way.

We've known for decades that plants have the amazing ability to pluck sunlight out of thin air and use its energy to convert carbon dioxide and water into the food that all animals, including us, need to survive. We also know that some orchids can produce blooms that look so much like female bees that they are magnets for the lovesick males who unintentionally pollinate the plants, while attempting to copulate with their flowers. Yet plants are still regarded as botanical automatons.

In the past 10 or 20 years, however, a trove of new findings are making the investigation of complex plant behaviors a serious scientific endeavor. No one expects to find evidence of a photosynthesizing Einstein. But there are lots of data demonstrating that plants live rich sensual lives and communicate with other plants and animals, as well as enough evidence to argue that they also carefully consider their environment, store and retrieve memories, speculate on the future, and solve complex problems. These astonishing new discoveries could transform the way we see the world.

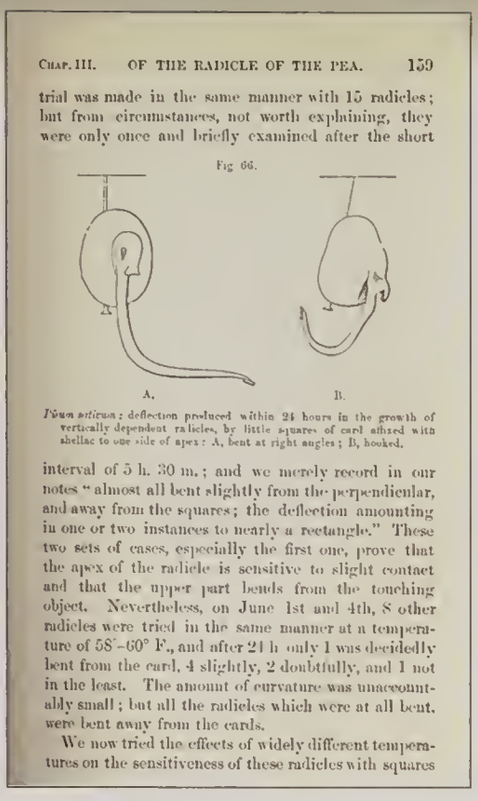
Darwin Versus the Great Chain of Being

Picture Charles Darwin in his final years, his beard long and gray, hunched over plants in

A sprouted garbanzo bean. Charles Darwin declared that the radicle, or baby root tip, of plants "acts like the brain of one of the lower animals." (Photo courtesy Navaneeth Krishnan S, Wikipedia Commons.)

the greenhouse that served as his home laboratory. Although Darwin is best known for his voyage on the *HMS Beagle* and the resulting theory of evolution, he actually spent most of his time studying orchids, Venus flytraps and countless other plants at his country house in Kent.

In a series of experiments, Darwin noticed that when a radicle (baby root tip) encountered an object—like a plate of glass—through which it could not grow, it would change direction. After painstakingly ruling out mechanical explanations for this phenomenon, and experimenting with distantly related plant species, he concluded that the root tips of nearly all plants are sensitive to touch.



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trial was made in the same manner with 15 radicles; but from circumstances, not worth explaining, they were only once and briefly examined after the short

Fig. 66.

A. B.

Pisum sativum: deflection produced within 24 hours in the growth of vertically dependent radicles, by little squares of card affixed with shellac to one side of apex: A, bent at right angles; B, hooked.

interval of 5 h. 30 m.; and we merely record in our notes "almost all bent slightly from the perpendicular, and away from the squares; the deflection amounting in one or two instances to nearly a rectangle." These two sets of cases, especially the first one, prove that the apex of the radicle is sensitive to slight contact and that the upper part bends from the touching object. Nevertheless, on June 1st and 4th, 8 other radicles were tried in the same manner at a temperature of 58°-60° F., and after 24 h. only 1 was decidedly bent from the card, 4 slightly, 2 doubtfully, and 1 not in the least. The amount of curvature was unaccountably small; but all the radicles which were at all bent, were bent away from the cards.

We now tried the effects of widely different temperatures on the sensitiveness of these radicles with squares

Darwin was so impressed that he wrote an entire book, "The Power of Movement in Plants" (1880), on these experiments. He noted the ability of the root tip to sense and move away from objects that might cause damage and was amazed at its ability to grow actively toward sources of water and gravity. "It is hardly an exaggeration," he concluded, to say that the root tip, "having the power of directing the movements of the adjoining parts, acts like the brain of one of the lower animals..." Darwin, in other words, didn't just put forward the idea that humans and the rest of the natural world, including plants, share a common evolutionary ancestor. He was the first person in the history of modern botany to recognize intelligent, purposeful movement in plants.

In fact, Darwin went even further, declaring that one of the most striking similarities between the movements of plants and animals "is the localization of the sensitiveness and the transmission of an influence from the excited part to another which consequently moves." That also makes him one of the first to recognize an electrical signaling system in plants that is analogous to the nervous system in animals.

Prior to the 19th century, and certainly before the publication of Darwin's "On the Origin of Species" in 1859, objects of nature were categorized by their placement on a graduated scale ranging from the inanimate to the divine. Aristotle is considered the first biologist in the Western tradition, or at least the first taxonomist, because he classified all living organisms hierarchically in his *scala naturae*, or what came to be called the Great Chain of Being. Each creature was more intelligent and perfect in form than the one below, with plants at the bottom and humans perched at the pinnacle of earthly life. Although Darwin's theory of evolution put a big dent in the Great Chain of Being, Aristotle's ideas continue to loom large in our view of nature.

Controversial Terminology: Plant "Intelligence"

One of the things that has kept plants at the bottom of the heap is their so-called sessile lifestyle. Rooted in place, plants can't just hightail it when they see a predator approaching or drive to the nearest Whole Foods in search of a meal when the cupboard is bare. They have had to evolve a totally different approach to survival. In a 2002 essay in the journal "Nature," Anthony Trewavas—a plant physiologist at the University of Edinburgh—noted that, "From their evolutionary beginnings, photosynthesizing plants eschewed movement because light was freely available." As a result, while animals typically behave by moving from place to place, plants behave by

ABOVE: In "The Power of Movement in Plants," Darwin described many experiments detailing the response of plants to stimuli such as light, gravity and touch. Here, he shows how the radicle of a pea moves around an object in its path, in this case a tiny piece of card attached to one side of the root tip.

moving in place, and their movements are usually the result of growth.

Although botanists have long been aware of this "phenotypic plasticity," it is Trewavas who first pointed out its significance. Plasticity, he wrote in "Aspects of Plant Intelligence" (2003), can be seen as the manifestation of a plant's awareness of its environment, "a visible witness to the complex computational capability plants can bring to bear to finely scrutinize the local environment and act upon it."

Trewavas' use of the word "intelligent" to describe plants wasn't exactly welcomed with open arms. The 1973 bestseller "The Secret Life of Plants," by Peter Tompkins and Christopher Bird, described dubious experiments, in which plants were hooked up to polygraph machines, and claimed there was scientific proof that plants are not only conscious but can sense human intentions and emotions. This gave the study of plant sensing and behavior a black eye—so much so that 30 years later anyone who described plants as "intelligent," even an esteemed scientist like Trewavas, seemed flakey.

The controversy peaked in 2005 when a group of scientists established the Society for Plant Neurobiology. Picking up on the hypothesis advanced by Darwin in the 19th century, they declared that the tips of plant roots and shoots, along with vascular tissues that transmit electrical signals, may well comprise the botanical equivalent of a nervous system. There is a fundamental difference between "The Secret Life of Plants" and current research—in which carefully controlled experiments, properly replicated, are now yielding hard data. But critics howled that plant neurobiologists had gone too far in describing plant behavior as intelligent— pointing out that the term "plant neurobiology" itself is nonsense, given that plants don't have neurons, much less brains.

Decentralized Information Networks

It's not too much of a stretch to call Stefano Mancuso of the University of Florence and Frantisek Baluska of the University of Bonn the "bad boys" of plant neurobiology, unwilling to apologize for using the term if it gets people to look at plants anew. In a 2010 TED Talk (visit www.ted.com/talks and search for "Mancuso") that has received more than half a million views online, Mancuso noted that studies indicate that a small region of the root apex, called the transition zone, has the highest consumption of oxygen in plants and is the locus of many electrical signals, called action potentials—the same signals found in human neurons. "We know that just a few hundred cells show this kind of feature," he said. But he went on to point out that even a small plant like rye has almost 14 million root tips—which adds up to a whole lot of action potential.

The bespectacled Florentine professor with a salt-and-pepper beard pointed to the big screen behind him, on the left of which was a representation of the Internet, which looked remarkably like the image of a root system on the right. They work in the same way, he asserted; they are both decentralized information networks.

Perhaps not surprisingly, given our position at the pinnacle of the pyramid of life, people have long assumed that a hunk of gray matter—a neurological control center—is a prerequisite for intelligence. But it wouldn't be very smart for a plant to have a centralized brain, since a predator, whether a grazing ruminant or lawnmower-wielding human, could easily chop it off. Cut off 90 percent of the root tips, and a plant can survive—just as you can destroy 90 percent of the Internet and the World Wide Web will still work.

Decentralized intelligence—it turns out, is an uncannily effective survival strategy.

ABOVE: "The Secret Life of Plants," published in 1973, featured quack experiments claiming to show that plants could read the minds of humans. The book has been largely discredited, but it has also made it difficult for serious scientists to tackle the subject of plant intelligence.

What a Plant Knows: Sensation, Arithmetic, Language

"Think about this: plants see you," writes Daniel Chamovitz, director of the Manna Center for Plant Biosciences at Tel Aviv University, in his book "What a Plant Knows" (2012). He goes on to explain how they not only see us but know when we come near them, if we're wearing a blue or red shirt, how long the lights have been on, and when the sun is about to set. Plants may not see in pictures the way we do, but in Chamovitz' words, they see "colors that we can only imagine," like "the ultraviolet light that gives us sunburns and the infrared light that heats us up." They are also aware of aromas all around them, may be able to hear, and, as Darwin observed, know when they are being touched.

If that weren't impressive enough, recent research has moved beyond demonstrating that plants are capable of sensation to revealing that they possess many attributes of a more complex intelligence.

Plant roots not only monitor at least 15 different environmental variables, like moisture and nutrients, but must create a 3-D perspective of their surrounding environment to exploit these resources and optimize growth. "To any wild plant the environment represents a continual maze that must be successfully navigated," says Anthony Trewavas. One of the tests of intelligence in animals is their ability to successfully navigate mazes in a lab, but the capacity of plants to grow through an environmental maze is not commonly assumed to represent intelligent behavior and attracts little attention.

The sine qua non of intelligent behavior, as Trewavas has also pointed out, is the capacity to predict the future and take appropriate action to maximize fitness. In one study, when young trees were provided with water only once a year, they learned over the next several years to predict when the water would be supplied and synchronized their growth accordingly.

Mathematics? New research shows that plants do some pretty complex arithmetic to prevent starvation at night. They need to measure the amount of starch in their leaves and estimate the amount of time until dawn by an internal clock, similar to our own body clock. They then have to divide the food reserve by the length of time until dawn so that by the time the sun rises, when they can resume photosynthesizing, around 95 percent of the starch has been consumed.

Language? It is often described as "that which makes us human." We may not think of them as gossipy social butterflies, but plants have their own chemical language. They communicate with their own roots and those of other plants—as well as various soil organisms—via a diverse repertoire of chemical compounds exuded through their roots. Last year, it was discovered that plants use mycorrhizal networks as underground messaging systems that alert neighboring plants of an aphid attack. They also produce bouquets of airborne fragrances to tantalize our noses and attract their pollinators, as well as an arsenal of chemicals to defend themselves from unwelcome herbivores and lure predators of the beasts that are causing the damage.

Plants, in fact, have an extensive vocabulary of chemical compounds. "We just have sound waves broken down into various languages. I don't see how we could bridge the gap," Stefano Mancuso quipped in an interview. He has also said that while a plant has about 3000 chemicals in its vocabulary, the average pupil has only 700 words. (Presumably, this is a reference to Pre-K students.)

Self and Kin Recognition

What really blows my mind are the studies indicating that plants can tell themselves from other individuals and even recognize kin.

"Self-recognition" is still another criterion considered essential to demonstrate intelligence. Simply put, if an animal in front of a mirror can recognize itself in the reflection, it is deemed smart. So far, elephants, bottlenose dolphins, orcas, a handful of primates (including humans more than 18 months old), and—most recently—European magpies, have passed the test.

But plants? They may not identify themselves in a mirror, and they may not have brains, but studies show that at least some plants are also

capable of self-recognition. The classic example is white bursage (*Ambrosia dumosa*), a nondescript woody shrub that looks like a low mound of lifeless twigs—except in spring, when it puts on a dense covering of small leaves and tiny yellow flowers. Also called burrobush, it is one of the two signature plants of the Mojave and Sonoran deserts.

Researchers found that the roots of individual bursage plants inhibited the growth of other individuals with which they came into direct physical contact but did not impede the growth of their own roots. In other words, they could distinguish "self" from "other."

Then there's the case of the Great Lakes sea rocket, *Cakile edentula* var. *lacustris,* a scraggly looking annual with small lavender flowers that colonizes sandy beaches where it gets battered about by the wind. At first glance, the plant would not appear to be a botanical wunderkind. But in August 2007, in the British journal "Biology Letters," plant ecologist Susan Dudley and graduate student Amanda File of McMaster University described an experiment in which they planted the sea rocket in pots. It turned out that there was less root competition when siblings shared the same container than when groups of strangers grew in a common pot. The Great Lakes sea rocket became one of the first plants lauded in the press for its ability to recognize its relatives, although Dudley is quick to point out that this doesn't mean its altruistic behavior is the result of a conscious cost-benefit analysis, or of warm and fuzzy feelings toward members of its family.

Still, the finding was unorthodox enough that it was met with "a whole lot of skepticism," in Dudley's words. In part this was because no one had discovered how plants manage to recognize their kin.

Dudley and colleagues from McMaster and Delaware universities plowed ahead, examining kin recognition in *Arabidopsis thaliana*, a small weed in the mustard family commonly known as mouse-ear cress, the botanical equivalent of the lab rat. In a two-part experiment, they grew seedlings in liquid growth media containing root secretions from either sibling plants, unrelated plants or their own roots.

The seedlings exposed to root secretions from unrelated plants grew significantly longer and more intricate root systems than those grown in root exudates from their siblings. But when the scientists inhibited root secretions, using a chemical called sodium orthovanadate, the differences disappeared. Now there was evidence for at least one mechanism for kin recognition in plants: Chemicals exuded by the roots served as the name tags.

Kin recognition has been studied widely in animals. Animals from apes to bees not only can recognize their relatives but often offer help, even at some cost to themselves—a behavior called "kin selection." Scientists believe this makes a kind of Darwinian sense: If you are genetically related to members of your family, helping them can perpetuate some of your genes, too.

But until quite recently there were no clear data demonstrating that plants benefit from behaving benevolently towards their relatives.

ABOVE: White bursage (*Ambrosia dumosa*) is capable of "self" recognition. Individual plants of this species can distinguish their own roots from the roots of other individuals growing nearby. (Photo courtesy Pieter B. Pelser, PhytoImages.)

Again it was Dudley and colleagues who, in 2012, documented some of the first evidence. This time the lab rat was *Ambrosia artemisiifolia*, the notorious ragweed, whose pollen leaves millions of humans dabbing continually at moist eyes and noses in late summer. They showed that ragweed plants grown among kin develop larger mycorrhizal networks than those grown among non-kin, and that the more elaborate fungal webs afforded better protection against pathogens.

Dudley stresses that there is still a lot to learn about kin selection among plants. But in a few short years, the study of plant altruism has moved from dubious endeavor to establishment science.

Might Plants Feel "Pain"?

For more than 200 years, there has been scientific evidence that anesthesia has the same effect on widely different life forms, including plants and animals—inducing an unresponsive state similar to a coma. Ethylene, a plant hormone, has been used as an anesthetic on humans. Ethylene is produced from essentially all plant parts—including leaves, stems, roots, flowers, fruits, tubers and seeds—and plays a role in many aspects of plant development, including ripening. Ethylene is also released after a plant is wounded. Until recently, however, plant physiologists failed to connect the dots. In a 2009 paper that appeared in the international journal "Cognitive Processing," Mancuso and Baluska made the logical leap: "As ethylene is released after wounding," they wrote, "it might act to relieve 'pain' in plants."

Even if they don't perceive pain the same way we do, that is a disconcerting thought.

What are we supposed to think about creatures that can not only eat sunlight but act altruistically toward relatives and perhaps, just perhaps, are capable of feeling pain?

Ethicists are already exploring the ramifications. But we certainly can start by questioning the ancient pyramid scheme that places us conveniently at the top. There is no question that humans are exceptionally intelligent animals, but our superiority complex is in large part responsible for the way we have managed to mess up the biosphere.

Thinking of plants as photosynthesizing simpletons can be traced back to this millennia-old misconception. But thinking about them as sensitive New Age guys and gals à la "The Secret Life of Plants" is just another form of human-centeredness. Our evolutionary paths diverged a couple of billion years ago, and neither anthropocentrism nor anthropomorphism do justice to these fascinating, alien (to us) beings that perceive in ways we can barely imagine. ~

Janet Marinelli is an author, journalist and former director of publishing at Brooklyn Botanic Garden. Through her firm, Blue Crocus Consulting, she helps public gardens and other museums find lively and artistic new ways to engage their visitors in conversations about sustainability and the natural world. Find out more at www.janetmarinelli.com.

ABOVE: Plant ecologist Susan Dudley, of McMaster University, working on a new "kin recognition" experiment with wild bergamot (*Monarda fistulosa*). She's looking to see if plants grown among relatives allocate more resources to asexual reproduction, compared to plants grown among strangers. (Photo courtesy Sebastian Irazuzta and Emily Stacy.)

GET TO KNOW YOUR ARBORETUM

By Patrick Mulligan

Having worked at Washington Park Arboretum for the University of Washington Botanic Gardens for more than four years, I know it can be a confusing place to visit—and that guests do occasionally get lost. In an effort to remedy this, the Arboretum made strides last year by installing two new trails, the Pinetum Loop and the Lookout Loop, complete with trail markers and interpretive signage. We also added some new large maps at key locations, updated the collection signs and trail maps, and continued working on a new, interactive digital map of the grounds (coming soon to an app near you!) using high-tech GIS equipment.

Nothing Beats a Good Guide

Signs, maps and gadgets aside, however, the very best way to get to know this place and its unique collections is to take a tour with someone who knows their way around. A lot of options are available. Every Sunday from 1:00 to 2:30 p.m., trained garden guides lead free "seasonal highlight"

LEFT: Azalea Way in late May.
(Photo by Niall Dunne)

—Dr. John Wott and Ray Larson Invite You to Take a Closer Look

tours of the Arboretum, leaving from the Graham Visitors Center. The Arboretum Foundation offers free "Arboretum Walks & Talks" tours each month to its Arbor Circle, Legacy Circle and Stewards-level members. You also can call UW Botanic Gardens at 206-543-8801 year round to arrange a private tour for a small fee.

In the coming months, UW Botanic Gardens is offering two new behind-the-scenes programs hosted by two of the people who know this place the best: Dr. John A. Wott, former director of the Arboretum from 1988 to2004, and Ray Larson, the current Curator of Living Collections. John will host a series of seasonal, morning walking tours in the Arboretum, while Ray will be giving evening lectures at the Graham Visitors Center, profiling the most interesting plant collections at the Arboretum and the Center for Urban Horticulture. I sat down with John and Ray (separately) to see what makes them tick.

Though 20+ years separate these two men born and raised in different parts of the country, I was struck by things they have in common. Both credit their love of plants to having farmers in the family tree. Ray had farmers on both sides, including a great grandfather who grew award-winning dahlias in Wisconsin. And though Ray, himself, grew up around Seattle, he remembers spending summers helping out in his parents' p-patch. John, a true farm boy, grew up on a farm in Ohio that had been in his family for five generations. He fondly recalls mowing lawns in middle school and pouring over seed catalogues during the winter months, waiting for the spring thaw to try out his chosen varieties.

Loving the Arboretum's Native Matrix

I asked John and Ray to tell me what they think makes the Arboretum special. John told me a story about the time the director of the Huntington Botanic Garden visited with his board for a retreat. John was a little anxious about what he could possibly show that would impress this group. He need not have worried; the visitors were mesmerized by our large old conifers. John summed it up well: "This is a major botanic garden immersed within a classic Northwest native matrix."

Ray, being fond of shade gardens, expressed a similar sentiment about our native backdrop and the varied terrain within which it's set. He added his appreciation for our mild climate that enables us to grow such a great variety of plants,

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~ WEDNESDAY WALKS ~
WITH JOHN WOTT

10:30 a.m. to 12 p.m.

Fee: $15
(increases to $20 one week before lecture)

"Azalea Way"—May 21
"Pacific Connections"—July 16
"Japanese Maples"—October 15

~ CURATOR TALKS ~
WITH RAY LARSON

Tuesdays, 7 to 8:30 p.m.

Fee: $10
(increases to $15 one week before lecture)

"Species Rhododendrons"—April 8
"The Hydrangea Family"—July 8
TBD—October 7

To register, visit https://www.cfr.washington.edu/uwbg/ or call 206-685-8033.

Dr. John Wott. (Photo courtesy Brian Wade.)

as well as for the curators who came before him and worked to develop a world-class collection. He knows this collection intimately and sees himself as a steward entrusted to carry on its tradition.

The Human Connection

Interestingly, for both of these plant geeks, it's the human aspect of the Arboretum that intrigues them most of all. John, as the first faculty/director, was a re-established bridge linking the University of Washington to the Arboretum. During his tenure, he once made over 200 "stump speeches" in one year to raise awareness among the public about this special place, as well as money to keep us growing. He told me that he doesn't necessarily care why somebody loves this place, just as long as they do.

Ray, by the same token, isn't overly concerned about having the best collection of this species or that, but wants to be able to look back in 20 years and say people value the Arboretum even more because of the experiences he helped to create. Ray sees both the Arboretum and Center for Urban Horticulture as demonstration gardens exhibiting the rich diversity of life, and as testing grounds to trial new plants that will bring enjoyment to people—whether they're experiencing the plants in our back yard or their own (though preferably, they'll be doing both).

Ray Larson. (Photo courtesy Barbara Larson.)

When I asked Ray why someone should attend John's walks, he said, "Because they will be so much more than just plant walks." Yes, John knows the plants, but perhaps more than anyone, he knows the story behind the plants. And in the field of horticulture, where personal relationships are a key part of building and maintaining a unique collection, there's a story behind every plant. When I asked John why someone should attend Ray's talks, he mentioned that he's known Ray since Ray was a college student and got to know him even better when Ray worked as weekend security at the Center for Urban Horticulture, where John's office was located at the time. John described Ray's knowledge of Northwest flora as "sincere."

Ray confirmed this for me when I asked him to name his favorite garden of all time. His answer: "A stretch of trail on Paddy-Go-Easy-Pass near Fish Lake that I visited as a graduate student during a class field trip with Sarah Reichard years ago." When I asked John for his favorite garden of all time, he answered, "My own." This was, no doubt, for the stories that accompany each and every specimen, and because it's now where he spends so much of his time.

Patrick Mulligan is the education supervisor for UW Botanic Gardens at the Washington Park Arboretum."

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A Native Groundcover with Star Power

By Niall Dunne

My tiny back garden in the Ballard neighborhood of Seattle is dominated by a 30-foot-tall Douglas fir on its west side. The tree—actually a funky-looking, weeping form of the species—takes up a lot a room and casts a deep shadow over the whole yard in the afternoon, but I love it all the same. I especially like how it attracts so many insect-feeding birds to the garden throughout the year. When my wife and I bought our home three years ago, nothing was growing at the base of the tree, which wasn't too surprising given that the dry, shady conditions present a challenge to many a garden plant.

I didn't want to leave the space bare, so I set out to create a small, native woodland garden filled with plants adapted to life under the coniferous canopy. My plant list included salal (*Gaultheria shallon*), dwarf Oregon grape (*Berberis nervosa*), deer fern (*Blechnum spicant*), bunchberry (*Cornus canadensis*), and broad-leaved starflower (*Trientalis borealis* ssp. *latifolia*). I bought very young, very small plants so as to minimize the potential for damaging the tree's roots during the planting phase—and also because young plants would likely adapt better to the tough conditions than larger, more pot-bound nursery stock.

When the young plants were in the ground, I dressed them with a layer of compost to enhance the organic layer of the soil but kept the compost layer pretty thin in order to avoid smothering the tree roots. (I do this every year because some of the plants I chose—such as bunchberry and starflower—prefer a damp, humus-rich

ABOVE: Broad-leaved starflower (*Trientalis borealis* ssp. *latifolia*) in bloom at the base of the author's Douglas fir tree. Some bunchberry (*Cornus canadensis*) is also visible.

environment.) I also watered the plants well for the first year to help them set down their roots without having to compete too much with the roots of the tree.

Three years later, the little garden is thriving. And my favorite plant in it? Without a doubt, it's the starflower. This small, perennial herb grows four to eight inches tall and produces a whorl of five to nine lance-shaped leaves at the top of a single stem. In spring, one to four pinkish-white flowers hover above the leaves on slender stalks, looking like diminutive forest "stars."

A common sight in low- to middle-elevation coastal forests of the Northwest, the broad-leaved starflower makes an excellent, low-maintenance groundcover, spreading quickly (but not aggressively) via its creeping tuberous rhizomes and knitting the shrub layer together. The leaves stay a fresh green color all the way into fall before they turn yellow and eventually drop.

The Kruckeberg Botanic Garden's MsK Rare and Native Plant Nursery (www.kruckeberg.org) will be selling the broad-leaved starflower at FlorAbundance in Magnuson Park on April 26 and 27. Nursery manager Roseann Beaudry says *Trientalis* is one of her favorite groundcovers. "It's planted profusely in our Native White Garden, along with trilliums, *Clintonia, Linnea*, and *Erythronium*," she adds. This garden features both *Trientalis borealis* ssp. *latifolia* and its similar (but less commercially available) cousin *Trientalis arctica*, the northern starflower—a denizen of bogs, wet thickets and meadows in the Northwest. ~

Niall Dunne is the editor of the "Bulletin."

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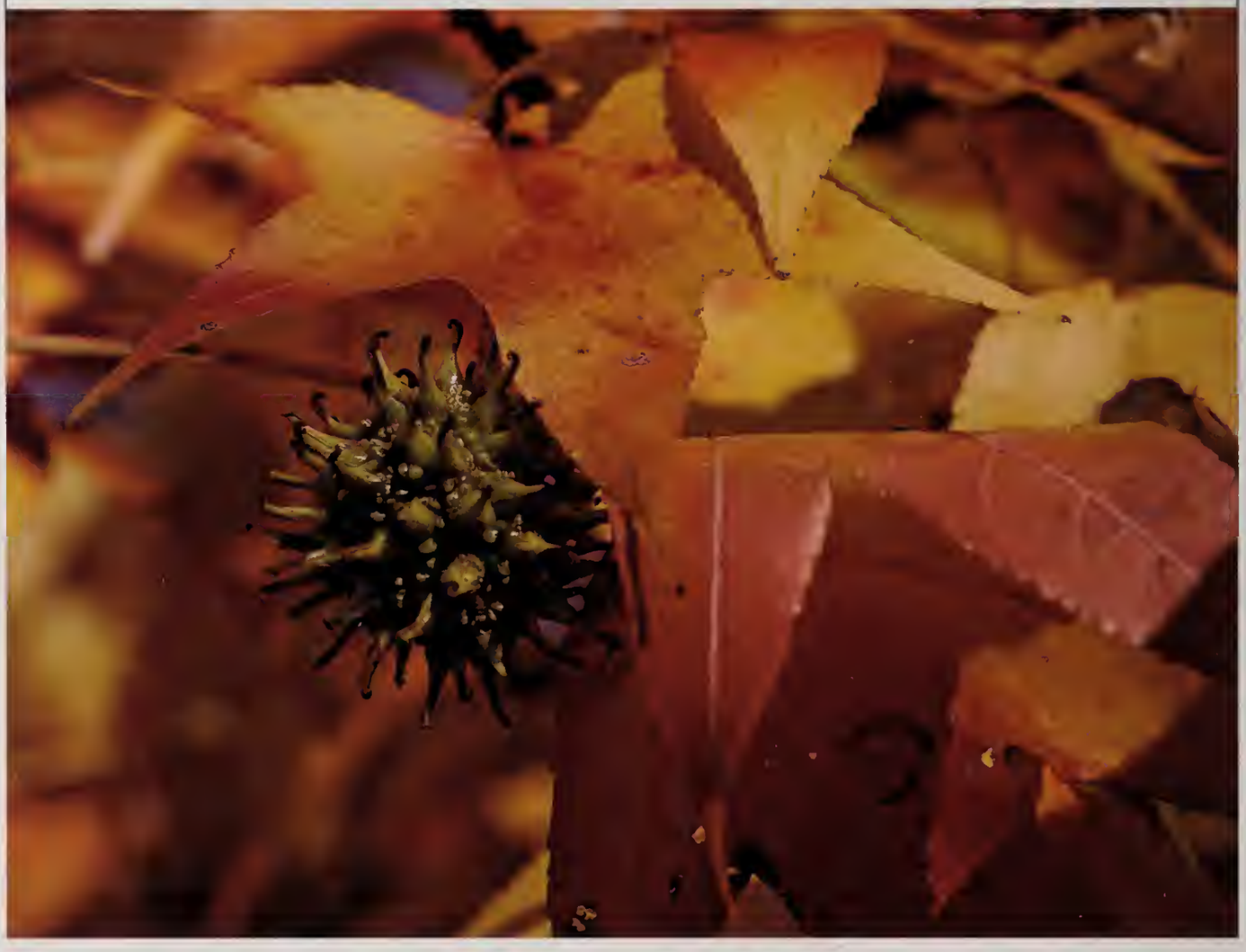
Q&A from the Miller Library's Plant Answer Line

THE STRANGENESS OF SWEETGUM

By Rebecca Alexander



Through its Plant Answer Line, the friendly and knowledgeable staff at the Elisabeth C. Miller Library has been fielding questions about plants and gardening—via phone and email—since 2001. The questions come from gardeners and other inquisitive folks all over the Pacific Northwest and beyond. Many of the questions and researched answers are published in the "Gardening Answers Knowledgebase" on the Miller Library website, www.millerlibrary.org. This new, regular column in the "Bulletin" will feature select Q&A from the Plant Answer Line program. If you should feel inspired to ask a question of your own, please call 206-897-5268 (UW Plant), send it through the library website, or email directly to hortlib@uw.edu.

QUESTION: I'm very worried about the trees in my neighborhood—I think they are maples—

ABOVE: Sweet gum's leaves look like those of a maple—and they produce lovely fall color. But the tree's spikey, spherical seedpod looks very different than the "whirlybird" of a maple. (Photo by Derek Ramsey, courtesy Wikipedia Commons.)

OPPOSITE: Corky, winged bark on a sweet gum twig. (Photo by Rosie Lerner, Purdue University Extension.)

which seem diseased. The bark on the branches comes up in strange-looking ridges. Do you know what might be wrong?

ANSWER: Fear not! I am fairly certain that these are sweetgum trees (*Liquidambar styraciflua*) and not maples. (The deeply lobed leaves of the sweetgum bear a strong resemblance to the leaves of many maple species.) You have just discovered the plant's "corky wings," which may appear on younger trees or on lower branches that are exposed to sunlight. Another plant that exhibits this odd-looking trait is *Euonymus alatus*.

QUESTION: How on earth did *Liquidambar* enter the otherwise Latin list of genera? I have asked a lot of gardening experts, and no one else seems bothered by this. Can you assuage my anguish?

ANSWER: Many botanical (scientific) names are not Latin in origin—some are Greek, or modeled after the name of the plant explorer who "discovered" them or the plant's geographical origins, to name a few possibilities. However *Liquidambar* does have Latin roots. According to Geoffrey Grigson's "A Dictionary of English Plant Names" (Allen Lane, 1974), *Liquidambar styraciflua*, a native of North America and Mexico, was introduced to Europe in 1683. But a Spanish physician and explorer of the New World, Francisco Hernandez, coined the name about a century before that.

Both the genus and species names refer to the tree's fragrant gum or resin, which was used in the manufacture of incense, perfume and medicine. "Liquidambar" comes from the Latin *liquidus*, meaning "liquid," and *ambra*, meaning "amber;" "styraciflua" is derived from a Latin phrase meaning "storax fluid." Storax was a name originally given to the resin of *Liquidambar orientalis*, the Turkish sweet gum—but it was eventually applied to the resin of the North American species, too. Sweet gum resin was also sold in apothecaries as *balsamum liquidambrae*.

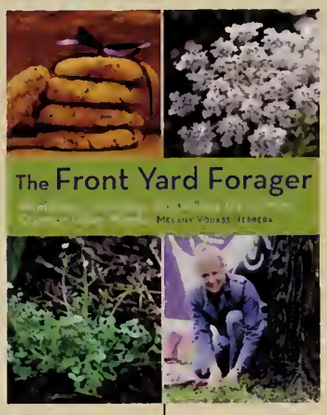
An article by Lesley Twomey ("Perfumes and Perfume-Making in the Celestina," "Bulletin of Hispanic Studies," volume 86, number 1, 2009) says: "According to Dioscorides: storax is the sap of a tree that resembles the quince tree. The best is yellow, fatty and resinous; it has whitish lumps, its scent lasts for a very long time and when softened, it releases some honey-like moisture." When crushed, the leaves of sweet gum also release a sweet scent.

Rebecca Alexander is the Plant Answer Line librarian at the Miller Library, located in the UW Botanic Gardens' Center for Urban Horticulture (3501 NE 41st Street, Seattle).

New Books for Pacific Northwest Gardeners

By Brian R. Thompson

Foraging—The Good and the Bad



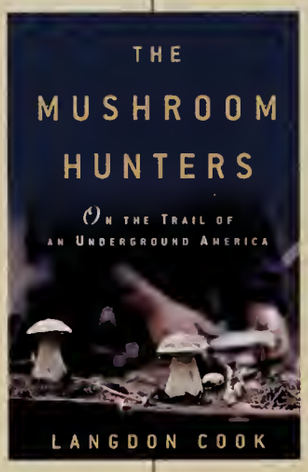
Melany Vorass Herrera is an enthusiastic and experienced forager who lives in Seattle. In "The Front Yard Forager," she identifies 30 common weeds found in North American cities that she recommends we add to our regular diet. I found her presentations, including recipes, beguiling—especially as my own garden is filled with several of her selections that until now I've tossed into yard waste.

Before encouraging us to head to the garden or local vacant lot, however, the author discusses several cautionary topics to help keep us, the foraging consumers, safe—and to ensure our collecting doesn't disrupt the ecology or social harmony of the neighborhood. For example, Vorass Herrera advises that you save a few whole plants from your foraging, so you can positively identify your selection in case you have a negative reaction to it. Further caveats fill each plant entry, including "Poisonous Look-Alikes" and "Who Should Avoid It" warnings.

While most of the selections, such as dandelions (*Taraxacum officinale*), have general consensus in the literature as safe to eat, some of Vorass Herrera's other choices are less certain. This makes as a good companion book the new edition of "The North American Guide to Common Poisonous Plants and Mushrooms," by two University of Victoria authors, Nancy J. Turner and Patrick von Aderkas.

The wild sweet pea (*Lathyrus latifolius*) illustrates the value of consulting at least these two sources before consuming any wild plant. Vorass Herrera recommends it when identification is certain, and when eaten only in moderation. Turner and von Aderkas, in contrast, state that all species of *Lathyrus* should be regarded with caution. However, they admit "a strong case is made for the edible qualities of...wild sweet pea (*L. latifolius*) by wild food expert John Kallas." A discussion of the arguments by Kallas follows, leaving you—the now well-informed forager—with three distinct opinions on the safety of putting this plant on your dinner table.

Vorass Herrera best sums up the importance of all this: "The bottom line? A good forager needs to be willing to spend a little time digging for accurate information."



More on Foraging and Other Adventuresome Pursuits

Speaking of foraging, few have perfected this practice as well as seekers of wild mushrooms. For those so inclined, the forests of the Pacific Northwest are a paradise.

Well, maybe. In "The Mushroom Hunters," Seattle author Langdon Cook asks what professional foragers get for their efforts: "An itinerant life on the road, continually moving with the seasons? A low hourly wage and no chance for health insurance? A garden variety of potential wilderness pitfalls, including injury, exposure, even wild animals?"

The answer is: all of the above, but that doesn't stop mushroom hunting from being a very big business. The collectors, those who buy from collectors, the distributors, and even the celebrity chefs who are at the top of this commercial

food chain, weave in and out of these pages much like in a high-energy, first-person novel. The settings, from the Yukon to California, are evocative, too, but mostly somewhat vague—the secret locations of valuable hunting grounds are not to be shared.

This is Cook's second book on foraging. The Miller Library also has "Fat of the Land" from 2009. In addition to discussing mushrooms, this book highlights the collection practices for fiddlehead ferns, dandelions, huckleberries and a selection of animals—including clams, crabs and various fish. Several recipes will set your mouth watering.

"Backyard Roots," by Lori Eanes, is a collection of vignettes about urban dwellers motivated to have a closer connection to their food and their communities. There are many ways to do this, and the strength of this book is its breadth of inspiring ideas that have already been realized. Making it even better, the individuals and families profiled all live on the West Coast, from British Columbia to Northern California.

Author/photographer Eanes has a career in food photography, and her original intent was a photo essay, but, she says in her introduction, "...as I learned people's stories, their dedication inspired me to write about them too." While the writing is good, Eanes's camera is particularly effective at bringing out the personalities of her subjects—both human and animal.

While some of the projects, such as raising ducks or goats, are addressed in detail in other books, others feel fresh and adventuresome. These include raising tilapia in an aquaponic garden and grafting food fruits onto ornamental street trees, guerrilla style. I gave a copy of this book as a Christmas gift, and I recommend it highly, especially to anyone with the spirit and resourcefulness of a homesteader.

Two books by a Portland Landscape Designer

Vanessa Gardner Nagel is a Portland-based landscape designer who has written two books recently added to the Miller Library. The first, "Understanding Garden Design" (published in 2010), is so well organized and structured it could easily be used as a textbook, but that may misleadingly suggest dullness, when this is in fact a very readable and engaging book.

To ensure the reader gets the best out of this book, the author does expect you to work, leading you through the steps that a professional designer would follow. Much of this work is required before you reach the fun part about choosing plants, which aren't discussed until Chapter 8—and then only as elements of structure. (Nagel uses the analogy of punctuation to describe the different selections—some plants are commas, others are parentheses, etc.)

Included with each chapter is a hypothetical garden design that uses the principles discussed and ties all the other concepts together. Even if you decide to hire a designer, this book will help you speak and understand the language of design and improve your ability to express your desires. You also will find very useful a whole chapter on working with contractors.

Nagel's newer book, "The Professional Designer's Guide to Garden Furnishings," identifies its primary audience in the title, but there's much here for the discriminating homeowner, too. Especially valuable are the detailed, chapter-length analyses of the many materials that can be used in furnishings—including wood, metal, textiles, and even wicker, glass or stone. Each chapter includes the industry standards for high-quality finishing options, best maintenance practices and the sustainability of each material.

The author is at her best in both books when—after carefully presenting a concept—she explains how she will bend the rules. In a section on scale and proportion from "Furnishings," she states, "The old concept of small things in a small space simply isn't true. A couple of large objects in a small space can work splendidly..." and goes on to explain why this is so.

Miniature Gardening

As a boy, I did not embrace the hobby of making models. Yes, I had a train set, but no desire to

create a world of villages, forests, and the like to surround the tracks. Instead, I wanted to be outside in the garden and working with full-sized plants.

This makes me feel somewhat unqualified to review "Gardening in Miniature," by Seattleite Janit Calvo. However, it turns out that at its heart, this is a gardening book, with sound design advice and cultural tips, with the main exception being that all the hardscaping, furnishings and ornaments are at a scale of 1:12 (one inch = one foot) or even smaller.

"Using the basic garden tenets of anchor point, balance, layers, texture, color, and focal point, you can plan your miniature garden with confidence," the author states encouragingly. Step-by-step, fully planned projects provide lots of guidance for the beginner. I worried that the plants would not stay to scale, and indeed they might not, but I learned that it's easy to swap plants in and out.

I also learned that while there is some overlap in principles and techniques between miniature gardening and bonsai, they are largely distinct pursuits. That said, it's okay to combine the two by making a bonsai the centerpiece of your miniature garden. Will I take up miniature gardening? Probably not. But my eyes have been opened to a whole new—and quite small—world.

Birds and Other Life at the Union Bay Natural Area

Finally, Constance Sidles has written her third book of essays and observations on the Union Bay Natural Area, titled "Fill of Joy: More Tales from Montlake Fill." Like her previous books, this one includes many excellent photographs and other artistic interpretations of the site (in paintings, poetry, and even dance) and an updated bird list, now counting 255 species recorded since the 1890s.

The heart of the book remains Connie's self-deprecating humor and philosophies about life. While the bird life is her focus, she spots humans and other visitors, too. "When the joggers wheeze by...they smile and say hello. I don't know their names, but I know them. The dog walkers who keep their dogs leashed stop to chat while I ruffle their friends' ears; the dog walkers who let their dogs run free usually head the other way...my gimlet eyes are giving them the Look."

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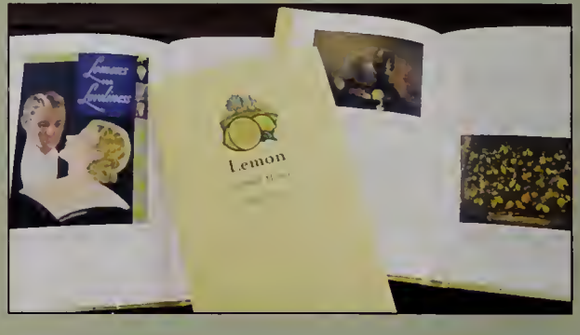
Writing Globally and Locally



As the title suggests, "Lemon: A Global History" has a world-wide perspective, but the author Toby Sonneman is from Bellingham. It is one of over 40 titles (so far) in the "Edible" series of food histories from Reaktion Books of England and draws on the research and writing of authors from around the world. The Miller Library is acquiring all those featuring plant-based foods, but—sorry—you'll need to visit another library for the book on hot dogs.

Rebecca Alexander, Plant Answer Line librarian for the Miller Library, recently wrote an excellent review of "Lemon" for the library's catalog and website. She writes that, "This pocket history reaches from antiquity to the present time, and is packed with colorful details and illustrations." To read all of this review, visit www.millerlibrary.org, click on "Find a Gardening Answer," and search for "Sonneman."

is also a member of the editorial board of the "Bulletin."

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